Government Responses and Comments on Recommendations Included in the Report of the Port Hardy Ferrochromium Review Panel

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GOVERNMENT RESPONSES AND COMMENTS ON RECOMMENDATIONS INCLUDED IN THE REPORT OF THE PORT HARDY FERROCHROMIUM REVIEW PANEL

INTRODUCTION

This is a consolidated federal/provincial response to the recommendations contained in the report of the Port Hardy Ferrochromium Review Panel. It represents the integrated views of the various federal departments and provincial agencies that participated in the review.

The assessment of this project required understanding of a complex, new technology; knowledge of a rich ecological setting and appreciation of diverse community values. The extensive review process conducted by the Panel and the thorough analysis provided in the report enables government to have confidence in its conclusions and recommendations.

After careful consideration of the Panel's conclusions and recommendations, the two levels of government have accepted the Panel's conclusions and have not rejected any of the recommendations. The majority of the recommendations have been either "accepted" or "accepted in principle". By "accepted in principle" it is meant that the objective of the recommendation is understood and accepted but the specific method of implementation may require modification, or the recommendation requires further clarification or review. One recommendation is directed to the proponent and no action is required by government, however the governments do agree with the recommendation. Finally, in one instance where the recommendation was not project specific it was noted in the response that the recommendation would be taken under advisement by the Provincial government.

The Panel concluded that the proposed Bear Cove site in Hardy Bay was not ideally suited to the ferrochromium plant due to the environmental sensitivity of Hardy Bay, and not acceptable in light of unresolved Native issues. The project proponent has already indicated that he has decided not to pursue the Bear Cove site and is investigating alternative plant locations, including other sites in the Port Hardy area. Government review of the Panel report took this intention into account. Many recommendations are site specific and would require further investigation at another location. These are noted in the responses.

Process Technology

Recommendation:

1. The Panel recommends that, in view of the controversy surrounding the solubility of chromite ore, samples of all chromite ores should be subjected to leach testing before shipment to the plant.

Government Response[1] - Accept recommendation in principle.

Comment: Recommendation is interpreted to mean that only chromite ores that pass the test are to be used and that passing the test refers to meeting chromium effluent levels in Schedule 1 of the Special Waste Regulation. A monitoring and enforcement mechanism will be required.

Recommendation:

2. The Panel recommends that the proponent be required to build and operate a dedicated docking and off-loading facility from the commencement of the project, in order to assure effective control of the raw materials.

Government Response - Accept recommendation in principle.

Comment: This recommendation is site specific and will need to be re-evaluated as part of the environmental assessment for the proposal at a new site.

Recommendation:

3. The Panel recommends that a reliable, acceptable scheme for off-loading must be designed that sufficiently minimizes spillage to meet stringent sediment guidelines. This will require considerably more engineering effort.

Government Response - Accept recommendation.

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[1]. Responses from appropriate federal and provincial government Departments including: Western Economic Diversification Canada; Environment Canada; Fisheries and Oceans Canada; B.C. Environment; B.C. Ministry of Health; and B.C. Ministry of Regional and Economic Development.

Recommendation:

4. It is recommended that, from the dock to the storage area, the conveyor system must be covered and there must be dust extraction hoods and water spray at transfer points in accordance with accepted engineering practice.

Government Response - Accept recommendation in principle.

Comment: The ore transfer system must be equipped with accepted dust control devices. The appropriate level of control and the most effective way of carrying it out must be re-evaluated at a new site.

Recommendation:

5. It is recommended that, before proceeding with construction, the final raw material handling and storage scheme be approved by the appropriate ministries of government, with the objective that it must satisfy those bodies that the opportunities for spillage and other losses of material to the environment are minimized.

Government Response - Accept recommendation.

Recommendation:

6. It is recommended that the raw materials storage facility should be a fully enclosed building in order to prevent wind losses and any potential leaching from the storage site.

Government Response - Accept recommendation in principle.

Comment: This recommendation is site specific and will need to be re-evaluated as part of the environmental assessment for the proposal at a new site.

Recommendation:

7. It is recommended that the system for recycling the baghouse dust must be totally enclosed and that the technology for recycling baghouse dust (potentially contaminated with arsenic, zinc and chromium) must eliminate fugitive dust emission, based on Best Available Control Technology in current use.

Government Response - Accept recommendation in principle.

Comment: Clarification by the proponent of some aspects of the design are required.

Recommendation:

8. The Panel recommends that, due to the untested nature of this plant and the remaining uncertainties, it is appropriate to apply a "worst case scenario" approach to its environmental assessment and any permits that might be issued for this project.

Government Response - Accept recommendation.

Comment: While this approach is accepted for the ferrochromium project, for future projects the need for a "worst case scenario" approach will be determined on a case by case basis.

Recommendation:

9. The Panel recommends that emissions from the flare stack must be included in the permit levels for total emissions, expressed in grams per hour, from this plant. These combined emissions should not exceed the permitted total mass rate.

Government Response - Accept recommendation in principle.

Comment: Emissions from the flare stack can only be estimated. It is impractical, therefore, to include them in the permit levels for total emissions. B.C. Environment will make it a condition of the Waste Permit that flare stack use be recorded.

Recommendation:

10. It is recommended that any water used to remove "scale" from the steam ejector should be handled as contaminated process water.

Government Response - Accept recommendation.

Recommendation:

11. The Panel recommends that the data on which the water treatment plant is designed, including the design criteria, equipment selection and sizing, be fully resubmitted by the Proponent and reviewed and approved by the B.C. Ministry of Environment. This review must take into account:

    (1) adequate rainwater and process water storage for flood conditions.

    (2) plant sizing to treat surplus water in times of excessive rainfall.

    (3) contingency plans in the event storage and plant capacity are inadequate for short term emergencies.

Government Response - Accept recommendation.

Recommendation:

12. The Panel recommends that containment basins should be of sufficient volume to store all excess process water and excess storm water run-off, with provision of additional storage capacity, such as a lagoon, to handle heavy rainfall periods. The plant must be zero discharge as proposed.

Government Response - Accept recommendation.

Receiving Environment

Chromium/Public Health Assessment

Recommendation:

1. The Panel recommends that in the public interest, hazardous substances such as chromium should be regulated so that no detectable effect on human health is created. This includes ensuring that the risk of additional cancer incidence is minimized to less than one in a million in accordance with standards adopted by a number of organizations internationally, including the U.S. EPA.

Government Response - Accept recommendation in principle.

Comment: Agree that development must not be at the expense of unacceptable human health risks. It is government's understanding that the EPA currently has some environmental standards that imply risks significantly greater that one in a million. A less than one in a million risk to the affected population is not necessarily appropriate.

Recommendation:

2. Accordingly, it is recommended that the ambient objective for Chromium VI should be the current EPA ambient level suggested by the proponent, an air concentration of 0.085 ng m^{-3}.

Government Response - Accept recommendation in principle.

Comment: No averaging period is given. An averaging period is critical in setting ambient air quality objectives. It is assumed that the averaging period is one year, however, B.C. Environment will seek clarification on this before establishing the objective.

Recommendation:

3. The Panel recommends that, wherever the plant is sited, the total chromium ambient value of 0.002 ug/m^3, based on the recent EPA RfC proposal, must be achieved, met or exceeded in air modelling analysis for all inhabited areas.

Government Response - Accept recommendation in principle.

Comment: No averaging period is given. It is assumed that the recommendation means that ambient values of 0.002 ug/m^3, on a yearly basis, must not be exceeded in air modelling analysis. B.C. Environment will seek clarification on this before establishing the objective.

Recommendation:

4. Also, it is recommended that the current B.C. total chromium ambient standard of 0.05 ug/Nm^3, enforced on a yearly basis, not be exceeded at any point outside the perimeter of the plant.

Government Response - Accept recommendation.

Comment: B.C. Environment will use the chromium values in recommendations 2(as clarified) , 3(as clarified) and 4 of this section as guidelines for permitting for this project.

Recommendation:

5. It is recommended that the emission rate for total chromium be set at 2.0 mg Nm^{-3} (refer to Lemmon: file 393) and allowed only if the ambient levels set above are predicted to be achievable by the modelling studies. The corresponding mass rate is 41.7 g/h (grams per hour).

Government Response - Accept recommendation.

Comment: In this recommendation, the Panel proposed an emission rate for total chromium conditional on the air modelling studies achieving expected results. The proponent will be required to do further modelling and BACT analysis.

Recommendation:

6. Furthermore, it is recommended that 0.05 ug/Nm^3 total chromium value should be regulated as achievable on an annual basis, and not the implied 24 hour in the B.C. Pollution Control Objectives. (file 405-Govt. 41).

Government Response - Accept recommendation.

Recommendation:

7. It is recommended that all ambient values should be regulated by specified time periods (hourly, 24 hour or yearly) in the B.C. Pollution Control Objectives.

Government Response - Accept recommendation.

Comment: B.C. Environment will make these changes in the documents that replace the B.C. Pollution Control Objectives.

Air Emissions Assessment

Recommendation:

8. The Panel recommends that the proponent be required to complete further BACT analysis of air emissions, based on and including the items suggested in the correspondence from panel experts as contained in files 566-Pan/Ex.47 and 461-Panel.50.

Government Response - Accept recommendation.

Recommendation:

9. It is further recommended that the Ministry of Environment should await the proponent's completion of this BACT analysis prior to the consideration of the issuance of permits.

Government Response - Accept Recommendation.

Comment: BACT analysis and its evaluation should precede any further modelling.

Recommendation:

10. Based on its experience in this review, the Panel recommends that future Environmental Review Panels and other major project review processes have available the emission values (mass concentration and mass rate) that have been set in waste management permits over the five-year period prior to the particular assessment.

Government Response - Accept recommendation.

Comment: B.C. Environment is prepared to supply such information upon request, where possible.

Recommendation:

11. Furthermore, the Panel recommends that standard conditions (percentage O_2, CO_2 in the gas stream, temperature, pressure) be clearly stated for all emission sources, including power boilers and combined process-power-fugitive emission stacks.

Government Response - Accept recommendation.

Comment: B.C. Environment already refers to standard conditions of temperature and gas in all cases. Where applicable, B.C. Environment sets reference conditions for CO_2 or O_2.

Recommendation:

12. The Panel recommends that, for permitting purposes, the proponent should provide estimates in kg/hr. of fugitive particulate emissions from all sources.

Government Response - Accept recommendation.

Recommendation:

13. The Panel recommends that the permit values in Table 3-A2 for SO_2, nitrous oxides (as NO_2) and particulate be adopted.

Government Response - Accept recommendation.

Comment: B.C. Environment accepts the permit values as guidelines in permit preparation for this project.

Recommendation:

14. It is recommended that the proponent complete its air modelling on the basis of a 34 meter stack height, in accordance with the GEP guideline for maximum stack height to building height ratio of 2.5. Dilution air should not be used.

Government Response - Accept recommendation.

Comment: The GEP guideline is a new and acceptable guideline for B.C. Environment.

Recommendation:

15. The Panel recommends that any permit issued should specify that organic compounds (specifically PAH) should not occur at any detectable level in the stack gases.

Government Response - Accept recommendation in principle.

Comment: It is agreed that organic compounds will need to be controlled to a level considered acceptable by B.C. Environment. Given that advances in analytical technology is allowing detection of increasingly lower levels of contaminants, it would be difficult, if not impossible, to achieve the "no detectable level" recommended by the Panel.

Recommendation:

16. The Panel recommends that with regard to emissions for chromium and trace elements a conservative approach should be adopted by setting the revised values given in Table 3-B1 (Section 3.3.2) as permit levels.

Government Response - Accept recommendation in principle.

Comment: B.C. Environment will use these values as a guide in permit preparation for this project. Before putting emission levels on a permit for a new site, BACT, air modelling and effect of ambient air quality on the environment must be re-done by the proponent.

Recommendation:

17. The Panel recommends that the proponent undertake a complete revision and summary of the deposition data.

Government Response - Accept recommendation.

Freshwater and Marine Impacts Assessment

Recommendation:

18. It is recommended that the monitoring program should include observation of the effects that biocide treatments have on marine life.

Government Response - Accept recommendation.

Recommendation:

19. It is recommended that the Department of Fisheries and Oceans, Environment Canada, and the B.C. Ministry of Environment should require the proponent to obtain approval in advance of any alterations to the operation and cleaning of the seawater discharge pipe.

Government Response - Accept recommendation.

Recommendation:

20. The Panel recommends that the intent of the British Columbia regulations, with respect to thermal effects of marine discharges, should be followed in regard to any permits issued for the Sherwood plant.

Government Response - Accept recommendation.

Comment: This must be re-modelled for a new site.

Recommendation:

21. The Panel recommends the development and publication of guidelines for thermal discharges to marine and freshwater bodies in British Columbia.

Government Response: This is not a project specific recommendation. It will be taken under advisement by B.C. Environment.

Recommendation:

22. It is further recommended that the temperature at the outlet and the temperatures at successive radii (20, 50, 100 metres) be measured during the start-up period under a variety of current conditions to verify the engineering estimates.

Government Response - Accept recommendation.

Comment: The proponent will be required to take measurements until the engineering estimates have been verified.

Recommendation:

23. It is recommended that the full and satisfactory description of the marine baseline research program must be a condition for this project to proceed.

Government Response - Accept recommendation.

Recommendation:

24. It is further recommended that the baseline research requirements be specified by the Department of Fisheries and Oceans, Environment Canada, and the B.C. Ministry of Environment.

Government Response - Accept recommendation.

Recommendation:

25. It is recommended that any approval of the environmental acceptability of the Sherwood's water treatment proposal must be made on the basis of clarification of:

    (1) Storage capacity for unusual events rapid, heavy rainfall at night or during plant shutdown conditions. The proposal to sample and then discharge storm water is not considered to afford adequate environmental protection.

    (2) Discharge method and location.

Government Response - Accept recommendation.

Recommendation:

26. The Panel recommends that the most appropriate criteria for pollutant discharge for application to the Sherwood plant are those given in Table 3-C.

Government Response - Accept recommendation.

Comment: The recommended standards proposed in Table 3-C are accepted as guidelines for permitting for this project. It is understood and has been confirmed by Dr. West that the units for dioxin proposed by the Panel is 0.000015 micrograms per litre and not 0.000015 milligrams per litre.

Recommendation:

27. Furthermore, the Panel recommends that:

(1) These criteria should not be subjected to variance during periods of excess runoff as proposed in the 1979 Objectives.

(2) Bioassay must meet 96-h LC (lethal concentration) at 100 percent survival for 100 percent strength waste water, both on a static and flow-through basis using salmonids.

(3) Daphnia Magna acute lethality toxicity testing must be applied.

(4) The total suspended solids (TSS) must be subject to meeting the total chromium requirements (i.e. at 10 mg L^{-1}, the percentage of chromium in the TSS should be such that the total chromium value of 0.05 mg L^{-1} is achieved).

(5) Compliance must be achieved by process (blowdown) and storm water separately. Dilution of one by the other is not to be permitted.

Government Response -

(1) Accept Recommendation.

(2) Accept recommendation in principle.

Comment: Recommendation understood to mean discharge must be non-toxic, i.e. 100% survival for 100% strength waste water over a 96 hour exposure period using salmonids. Static basis is considered sufficient.

(3) Accept Recommendation.

(4) Accept Recommendation.

(5) Accept Recommendation.

Recommendation:

28. The Panel recommends that, as a condition of constructing the plant at this site, a shoreline buffer zone sufficient to protect the current abundance of foreshore habitats and species, should be part of the prescribed development plan.

Government Response - Accept recommendation in principle.

Comment: This recommendation is site specific and needs to be re-evaluated as part of the environmental assessment for the proposal at a new site.

Recommendation:

29. The Panel recommends that the construction and development plan for the site should be guided by the Department of Fisheries and Oceans, Environment Canada, and the B.C. Ministry of Environment, with attention to minimizing impacts to either of the two unnamed streams which cross the site and drain onto the foreshore, and to avoiding soil-laden runoff and slippage directly on to the foreshore.

Government Response - Accept recommendation.

Comment: A new development plan is required and will be evaluated for a new site.

Recommendation:

30. Based on the evidence considered and the objective of avoiding significant environmental impact, the Panel recommends that the sediment maximum Chromium Total concentration should be 60 mg/kg dry weight, and that the water quality standard in Hardy Bay, freshwater streams and rivers affected by the plant be maintained at 2 ug L^{-1} chromium, or baseline levels, whichever is the higher.

Government Response - Accept recommendation in principle.

Comment: This recommendation is site specific. Sediment and water quality standards would have to be re-evaluated as part of the proponent's environmental assessment at a new site.

Recommendation:

31. Pending publication of new comprehensive British Columbia "Receiving Water Quality" guidelines, the Panel recommends that ambient water parameters for trace elements in the fresh and marine waters in the vicinity of the site should be maintained at baseline levels or at the values in Table 3-E, whichever are lower. Furthermore, the Panel recommends that the sediment values "BC MoE Objectives" of Table 3-D be adopted.

Government Response - Accept recommendation in principle.

Comment: The recommendation will have to be re-evaluated at a new site relative to baseline levels of trace elements in the receiving environment.

Recommendation:

32. It is recommended that approval of this project be conditional on satisfactory analysis, based on final air dispersion modelling, to demonstrate that depositional impacts to water and sediments are within the levels given in Tables 3-D and 3-E.

Government Response - Accept recommendation in principle.

Comment: A re-evaluation of the limits recommended in Tables 3-D and 3-E will be required for a new site.

<u>Terrestrial Impact Assessment</u>

Recommendation:

33. It is recommended that the proponent be required to provide hydrological data to the Ministry of Environment, and that this data adequately demonstrate that water table penetration and contamination will be avoided through appropriate design of storage facilities.

Government Response - Accept recommendation in principle.

Comment: The requirement would be for collection of data on permeability of the substrate rather than hydrology.

Recommendation:

34. It is recommended that, to the greatest extent possible, the plant design and construction must retain the natural vegetation of the site. This should include the retention of a shoreline buffer of vegetation and sufficient tree retention elsewhere so as to screen the plant from view as much as possible.

Government Response - Accept recommendation in principle.

Comment: This recommendation is site specific and needs to be re-evaluated as part of the environmental assessment for the proposal at a new site.

Recommendation:

35. The Panel recommends stack location should be carefully assessed in order to mitigate possible impacts to nearby vegetation.

Government Response - Accept recommendation.

Recommendation:

36. The Panel recommends that the Chromium VI special waste leachability figure of 0.1 mg L^{-1} (B.C. MoE) be regarded as total soluble chromium, consistent with the analysis of the CrIII/CrVI speciation question rendered in this report.

Government Response - Accept recommendation.

Recommendation:

37. The Panel recommends that leachate tests should be performed on a simulated sample of the slag before the waste permits are issued for the plant. If it is determined that the slag exceeds leachability criteria, so as to be classified as "Special Waste", then it should be a condition of permitting that the Ministry of Environment be provided with and approve a plan to handle this material in a manner that does not pose a hazard.

Government Response - Accept recommendation.

Recommendation:

38. It is also recommended that regular leachate tests be conducted on slag produced during the operation of the plant.

Government Response - Accept recommendation.

Recommendation:

39. It is further recommended that the possibility of significant entry into the water table and hence the terrestrial environment must be avoided by using "hardened" sites for slag storage. This includes containment by berming and peripheral runoff collection systems.

Government Response - Accept recommendation in principle.

Comment: Implementation of this recommendation will depend on the data resulting from the tests specified in recommendations 33 and 38 of this section.

Recommendation:

40. It is recommended that facilities for handling such solid wastes and for safe storage of these materials on site must be addressed by the B.C. Ministry of Environment and by the proponent.

Government Response - Accept recommendation.

Recommendation:

41. The Panel recommends that if government determines that the proponent may proceed with the Bear Cove site, then all of the foregoing recommendations and the recommended monitoring program, as outlined in Section 5, should be applied.

Government Response - Accept recommendation in principle.

Comment: This recommendation is relevant for the Bear Cove site only.

Social Issues

Recommendation:

1. In consideration of enhancing public confidence, the Panel recommends that the B.C. Ministry of Environment be closely involved in all aspects of the establishment and monitoring of the standards which this report recommends for this project.

Government Response - Accept recommendation.

Recommendation:

2. In addition, we recommend that the British Columbia government ensure that the Ministry of Environment has available the resources and personnel to fulfil the specific tasks which have been referred to them under the Waste Management Act and the Environment Management Act.

Government Response - Accept recommendation.

Recommendation:

3. It is further recommended that the monitoring program be coordinated and supervised by the Ministry of Environment, that the proponent bear the costs of this monitoring program, and that there be full, open and timely supply of monitoring information to the public, through a locally-based committee of interest groups.

Government Response - Accept recommendation.

Recommendation:

4. The Panel recommends that the Ministry of Environment coordinate the formation of this locally based monitoring committee. It should be funded through the proponent's permit fees or a similar arrangement made for proponent sponsorship.

Government Response - Accept recommendation in principle.

Comment: It is agreed that there is value in having a locally based monitoring committee and that the B.C. Ministry of Environment should play a role in coordinating the formation of such a committee. It is not clear that there would be costs to people other than the proponent for monitoring.

Recommendation:

5. It is further recommended that participation in this monitoring committee should include the principal government agencies, as well as representatives from local organizations (including native groups) concerned with this issue.

Government Response - Accept recommendation.

Recommendation:

6. It is recommended that, as a condition of approval, the proponent be required to post a bond or other such security (acceptable to the Ministry of Environment) of a magnitude sufficient to provide for any clean-up operations that can be anticipated in a "worse case scenario" and to provide compensation to parties who might be adversely effected. The magnitude of this security should be determined by the Ministry of Environment.

Government Response - Accept recommendation in principle.

Comment: B.C. Environment will need to assess the basis for the amount of security, the mechanism for bonding and the implications of requiring bonding in this case.

Recommendation:

7. It is recommended that the proponent take every reasonable effort to hire as many as possible of its employees from both the native and non-native communities of the region.

Government Response - Agree in principle.

Recommendation:

8. The Panel recommends that the Provincial government carefully review the entire issue of the power rate offered to Sherwood at Nanaimo as to the extension of this offer to any other location. Consideration should be given to financial analyses (beyond the mandate of the Panel) in regard to the proponents's need for this reduced power rate and the duration of the discount.

Government Response -

Comment: The B.C government regards the recommendation as beyond the terms of reference of the Panel. In the opinion of the provincial government, the power rate discount was reasonable and required for the project to proceed. The implicit subsidy embodied in the arrangement, based on the projected actual consumption and B.C. Hydro's short-term marginal costs, is under $3 million and is not the $16 million potential subsidy figure suggested in the Panel's report.

Recommendation:

9. It is recommended that the final design of the buildings and the stack must have a minimal visual impact on nearby communities or recreational areas.

Government Response - Accept recommendation in principle.

Comment: The application of this recommendation will need to be re-evaluated at a new site.

Recommendation:

10. Notwithstanding the project's other merits, including its manageable environmental impact and its net social benefits, this Panel recommends that this project not be authorized on the selected site until such time as an agreement can be reached between the proponent and the native people, or until the outstanding land claim and treaty issues have been resolved by litigation or settlement.

Government Response - Accept recommendation.

Project Monitoring

Recommendation:

1. It is recommended that a comprehensive monitoring program be required, including baseline studies, start-up monitoring including stack testing, sampling locations and protocols, monitoring guidelines, and plant shutdown specifications, as outlined in this report (Section 5).

Government Response - Accept recommendation.

Recommendation:

2. The following baseline requirements are recommended:

   (1) Sufficient baseline data, particularly on the existing marine ecosystem in order that any changes induced by the facility can be detected following start-up.

   (2) Meteorological data, especially in terms of extent of data gathered in communities in proximity to the plant.

   (3) Physical oceanographic baseline data on Hardy Bay. In particular data from stations A and B was judged to be inadequate by the Department of Fisheries and Oceans and Environment Canada. This should be a one year program (Lewis: file 361-Pan/Ex.26).

Government Response - Accept recommendation in principle.

Comment: Accept in principle the requirement for baseline studies as part of the monitoring program. Baseline studies will be required as part of an assessment at a new site.

Recommendation:

3. In conjunction with the B.C. Ministry of Environment, and as a condition of the permitting process, the Panel recommends that:

   (1) Emission and effluent limits must be set, rather than using objectives or guidelines.

(2) Prescriptions for action (i.e. shutdown), or penalties, or emergency procedures (such as storage or effluent) must be set in conjunction with the emission and effluent limits.

(3) There must be specification of actions to be taken when pre-set levels of impact on the receiving environment are reached. These should be specified either in concentrations of contaminants (ambient air and water quality), or effects on ecosystems. The latter may be "no effects" levels, particularly for the productive Quatse River estuary. These would be specified for air, soil sediment and biota.

(4) Procedures and contingency plans must be submitted for maintenance, emergency and major failure situations that would require shut down or other such action.

(5) In view of the novel technology and developmental aspects of this plant, reporting mechanisms for routine informing the Ministry of Environment of such incidents (failures) should be established for a five year period.

(6) Government authorities must institute surveillance of the project and appropriate enforcement procedures. These should include:

a) Regular collection of test results, including a special one year study of chromium levels from air emissions, effluent, and leaching of slag and raw materials.

b) Unannounced sample collection by the Ministry of Environment, with independent analysis (including air, effluent and environmental samples -- biota, sediment).

c) A quality assurance/quality control review by the Ministry of Environment, including assessment of low level (trace) chromium test procedures. An outline of relatively conventional requirements is given in file 449-Pro.78. It is particularly important for the Ministry to make an assessment of the following:

i) detection levels in the proponent's procedures (especially chromium);

ii) quality assurance/quality control on leaching tests of slag and raw materials, particularly with respect to precision and accuracy;

iii) sampling protocols for biota and sediment, particularly in relationship to hypothesis targets for surface sediments layers and habitat locations.

(7) There must be an investigation of CrVI/CrIII operational levels and bio-availability (solubility of chromium in acid and base) after operational levels are reached and during the start-up phase.

(8) Finally, it is recommended that a focused, rationalized monitoring program must be designed that makes hypotheses on environmental impacts, designs a specific slate of samples and analyses to test them, and then provides action levels and remedial actions.

Government Response - Accept recommendation.

Recommendation:

4. It is recommended that public exposure to contaminants should be monitored by the following methods:

(1) Air monitoring in Beaver Harbour and Port Hardy, including total chromium analysis: Consideration should be given to frequent 24-hour high volume sampling in these locations. Dustfall samples should be subjected to CrVI/CrIII ratio analysis during the phase-in of the plant.

(2) Regular analysis of the public water supply for municipalities affected, including source and after-treatment sampling.

(3) Determining the coliform count in the vicinity of the seawater cooling outfall regularly, and transmitting the data to the public health office in Port Hardy. In this context, Sherwood must provide sewage dispersion information for the outfall when the heat exchanger system is not functioning.

(4) Monitoring the noise impact from the plant on surrounding residential communities, using measurements before and after commissioning. The proponent has undertaken to make such measurements. The public health office should assess effects.

(5) Monitoring for odour: The potential for odour is almost entirely in regard to "TRS" (total reduced sulphur), or H_2S in this case. Exclusion of this nuisance should be confirmed, based on start-up tests on slag quenching (cooling); these would be run by the proponent.

(6) Determining residual risk to human populations of Chromium VI, as a known carcinogen: This analysis would optimally be based on modelling projections, with the data obtained as outlined above.

Government Response - Accept recommendation in principle.

Comment: With respect to recommendations 4(1) and 4(6) the B.C. Ministry of Health has noted that high volume sampling is not a good means of assessing public exposure. Only inhalable chromium is of interest. Data on actual human exposure should go into any determination of risk in 4(6). Any plan for monitoring to assess risks to public health should be submitted for approval to the B.C. Ministry of Health. This recommendation is site specific and will need to be re-evaluated as part of the environmental assessment for the proposal at a new site.

Recommendation:

5. It is recommended that Sherwood implement a workplace hazards program, in cooperation with the Workers Compensation Board, that addresses issues such as the safe storage of hazardous materials (solvents, gasoline, chemicals) and protocols for spill clean-up to protect workers and to prevent excursions of contaminants and pollutants into the environment.

(1) The Panel recommends that the Workers Compensation Board re-assess the use of the TLV value, with a view to adopting the more conservative workplace ambient level of 0.05 ug/Nm^3.

(2) Furthermore, it is recommended that worker health and safety education, and the acquisition of baseline health information about the workers, should be undertaken as priorities during start-up.

(3) Finally, it is recommended that appropriate monitoring of chromium levels in employees before and after start-up should be undertaken.

Comment: This section of the report will be provided to the Workers Compensation Board (WCB) for consideration.

Government Response -

(1) Accept recommendation in principle.

Comment: The WCB regularly reviews all workplace exposure limits. Reviewers noted that there is a fundamental difference between T.L.V.s and ambient standards. A T.L.V. is not applied to an ambient air concentration, but applies only to workers' exposures. Given the nature of the activities at industrial sites, it is usually not possible to reduce workplace concentrations of contaminants to the level required by ambient air quality standards.

(2) Accept Recommendation.

Comment: Health information is required for all employees for the duration of the operation, not only at start-up.

(3) Accept Recommendation.

Recommendation:

6. As a new standard of major industrial project planning, the Panel recommends that contingency plans be established from the initiation of the Sherwood project to cover both short term and long term shut-down of operations.

Government Response - Accept recommendation.

Recommendation:

7. It is recommended that for short term shut-down, the following measure should be required:

   (a) the continued monitoring and treatment of storm water, including run-off from stockpiled raw materials, slag and waste;

   (b) site clean-up of all exposed material before or at the time of a shut-down;

   (c) continued analysis of storm water during the shut-down period, unless there is sufficient storage capacity to retain all run-off (for example, during a two week holiday period);

   (d) in the absence of a full site clean-up, continued operation of the full analytical and water treatment facility on a standby basis, if storage capacity for the shut-down period is not available;

   (e) provisions written into waste permit conditions ensuring that the financial resources will exist to carry out the monitoring and clean-up work necessitated by shutdown; this may necessitate the posting of a suitable financial bond.

Government Response - Accept recommendation.

Recommendation:

8. It is recommended that, in the event of long term shut-down, all wastes, raw materials, chromium-bearing slag (and other toxic elements) should be appropriately disposed of, and there should be final water table and soil testing to complete the shut-down work.

Government Response - Accept recommendation.